

Claims

1 1. A rubber composition usable for the manufacture of tires, comprising, as base
2 constituents, a diene elastomer, a white filler as reinforcing filler and a coupling agent
3 (white filler/elastomer) that links the reinforcing filler and the elastomer, the white filler
4 comprising a titanium oxide having the following characteristics:

5 (a) it comprises by mass more than 0.5% of a metallic element, other than
6 titanium, selected from the group consisting of Al, Fe, Si, Zr and mixtures thereof;

7 (b) its specific BET surface area is between 20 and 200 m²/g;

8 (c) its average particle size (by mass), d_w, is between 20 and 400 nm; and

9 (d) its disagglomeration rate, α, measured by the ultrasound disagglomeration
10 test, at 100% power of a 600-watt ultrasonic probe, is greater than 2x10⁻² μm⁻¹/s..

1 2. The composition according to Claim 1, wherein the total quantity of
2 reinforcing filler is between 20 and 400 phr (parts by weight to one hundred parts of
3 elastomer).

1 3. The composition according to Claim 1, wherein the BET surface area of
2 the titanium oxide is within a range of 30 to 150 m²/g.

1 4. The composition according to Claim 1, wherein the average particle
2 size d_w of the titanium oxide is within a range of 30 to 200 nm.

1 5. The composition according to Claim 1, wherein the disagglomeration
2 rate α of the titanium oxide is greater than 5x10⁻² μm⁻¹/s.

1 6. The composition according to Claim 1, wherein the reinforcing white
2 filler comprises more than 50% by weight titanium oxide.

1 7. The composition according to Claim 1, wherein the total reinforcing white
2 filler is titanium oxide.

1 8. The composition according to Claim 1, wherein the reinforcing white
2 filler further comprises silica and/or alumina.

1 9. The composition according to Claim 1, further comprising one or more
2 carbon blacks as a reinforcing filler.

1 10. The composition according to any of Claims 1 and 9, wherein the quantity
2 total of reinforcing filler is between 30 and 200 phr.

1 11. The composition according to Claim 1, wherein the quantity of coupling
2 agent is between 10^{-7} and 10^{-5} mole per square meter of reinforcing white filler.

1 12. The composition according to Claim 11, wherein the quantity of coupling
2 agent is between 5×10^{-7} and 5×10^{-6} moles per square meter of reinforcing white filler.

1 13. The composition according to Claim 1, wherein the titanium oxide satisfies
2 one or both of the following characteristics:

- 3 - its BET surface area is within the range of 70 to 140 m^2/g ;
4 - its particle size d_w is within the range of 50 to 100 nm.

1 14. The composition according to Claim 1, wherein the titanium oxide
2 satisfies all the following characteristics:

3 - it comprises by mass more than 1% of a metallic element other than
4 titanium, selected from the group consisting of Al, Fe, Si, Zr and mixtures thereof;

5 - its BET surface area is within the range of 70 to 140 m²/g;

6 - its particle size d_w is within the range of 50 to 100 nm; and

7 - its disagglomeration rate α is greater than $5 \times 10^{-2} \mu\text{m}^{-1}/\text{s}$.

1 15. The composition according to Claim 1, wherein the coupling agent is a
2 polysulphurized alkoxy silane.

1 16. The composition according to Claim 1, wherein the diene elastomer is
2 selected from the group consisting of polybutadienes, polyisoprenes, natural rubber,
3 butadiene-styrene copolymers, butadiene-isoprene copolymers, butadiene-
4 acrylonitrile copolymers, isoprene-styrene copolymers, butadiene-styrene-isoprene
5 copolymers, and mixtures thereof.

1 17. The composition according to Claim 16, wherein the diene elastomer is a
2 butadiene-styrene copolymer prepared in solution having a styrene content of
3 between 20% and 30% by weight, a content of vinyl bonds of the butadiene part of
4 between 15% and 65%, a content of trans-1,4 bonds of between 20% and 75% and a
5 glass transition temperature of between -20°C and -55°C.

1 18. The composition according to Claim 17, further comprising a
2 polybutadiene having more than 90% cis-1,4 bonds.

1 19. The composition according to Claim 1, wherein the diene elastomer is an
2 EPDM copolymer.

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1 20. A reinforcing filler comprising a titanium oxide having the following
2 characteristics:

3 (a) it comprises more than 0.5% by mass of a metallic element other than
4 titanium, selected from the group consisting of Al, Fe, Si, Zr and mixtures thereof;

5 (b) its specific BET surface area is between 20 and 200 m²/g;

6 (c) its average particle size (by mass), d_w , is between 20 and 400 nm; and

7 (d) its disagglomeration rate, α , measured by the ultrasound
8 disagglomeration test, at 100% power of a 600-watt ultrasonic probe, is greater than
9 $2 \times 10^{-2} \mu\text{m}^{-1}/\text{s}$, wherein the filler reinforces a diene rubber composition usable for
10 manufacturing tires.

1 21. A process for reinforcing a diene rubber composition usable for the
2 manufacture of tires, comprising incorporating by mechanical kneading into the
3 diene rubber composition in an uncured state a titanium oxide having the following
4 characteristics:

5 (a) it comprises more than 0.5% by mass of a metallic element, other than
6 titanium, selected from the group consisting of Al, Fe, Si, Zr and mixtures thereof;

7 (b) its specific BET surface area is between 20 and 200 m²/g;

8 (c) its average particle size (by mass), d_w , is between 20 and 400 nm; and

9 (d) its disagglomeration rate, α , measured by the ultrasound

10 disagglomeration test, at 100% power of a 600-watt ultrasonic probe, is greater than

11 $2 \times 10^{-2} \mu\text{m}^{-1}/\text{s}$.

- 1 22. A rubber article comprising a composition according to Claim 1.
- 1 23. A tire comprising a rubber composition according to Claim 1.
- 1 24. A colored tire comprising a rubber composition according to Claim 1.
- 1 25. A tread for a tire comprising a rubber composition according to Claim 1.
- 1 26. A colored tread for a tire comprising a rubber composition according to
- 2 Claim 1.